

October 28, 2022 by Matias Bessai

RJC Engineers Help Bring Complex Glass Designs to Life

30 years ago, if you were to look out at the skyline of Downtown Toronto, you would see the hints of what was to come. The high-rises, the bright lights, the density, all of these things that define the perpetually evolving Downtown core we know today were already there, just in an early adolescent state. In 2022, one looks out at the skyline to see a kaleidoscopic medley of textures that shine, reflect, and dance in the light. While concrete, brick, and stone is also there, a revolution has taken place; a revolution in glass engineering.

One of the firms at the forefront of glass engineering in the development context – in Canada and across North America – is [RJC Engineers](#). Earlier this week, UrbanToronto sat down with one of the Principals at RJC, [John Kooymans](#), a Professional Engineer with over 20 years of experience working with engineered glass systems, to learn more about his unique area of expertise. Discussing different projects in the GTA that he has been a part of, especially those that have seen some high engagement on UT, he explained the role RJC plays as consultants for developers and architects, and the possibilities that a project enjoys when working with experts.

One of the primary tasks that Kooymans is presented with as a consultant on development projects is assisting in the design of a glass system that is efficient not only in terms of usage, but in terms of installation as well. “If it’s a facade system for a tower,” he explained, “we’re actually engineering the facade to be the best system that it can be for the building not just aesthetically, but as an efficient system.”

This process is illustrated clearly through Kooymans’s involvement in developing the curtainwall cladding for [Mizrahi Developments’ The One](#), designed by [Foster + Partners](#). “The One is a very challenging high-rise project with a very unique curtainwall system. It’s been quite rewarding, but it did take a lot of time to get to where we are now” Kooymans told us. The system that was created, working with the design team, is known as a unitized curtainwall system. The entire panel, comprising glass, mullions, and framing, are prefabricated and delivered to the site, significantly reducing the time required for installation – but the cantilevered mullions and setbacks were only part of the challenge.



Looking southwest to windows on the lower floors of The One, image courtesy of Mizrahi Developments

“What gets really complicated, especially when you’re dealing with supertall structures, is that you have a lot of movements that you have to accommodate within the system,” Kooymans said. Wind and seismic activity are some of the forces that can cause movement, but the most constant and relentless force that needs to be accounted for, according to Kooymans, is gravity. In this way, RJC’s job was to assist in the design of prefabricated panels of curtainwall that could fit together perfectly upon installation, while still having a notable amount of wiggle room to accommodate movement. Sizing the joints and using the right gaskets and silicone were paramount to a successful system and a smooth installation process.

Another part of the work Kooymans does with architects and developers is helping them realize design feats that are highly challenging, technically and logistically. Kooymans refers to this process as ‘protecting the design’, and explained that he does whatever he can to ensure that the client’s vision for the project can be achieved.

“We don’t promise something that can’t be delivered, but we will do the research to find out what is possible,” he said. “Challenges are what keeps us going, that’s what keeps this business interesting.” How engineers are able to confront these challenges begins with having preexisting relationships with a network of industry insiders which, for Kooymans, date back to his days studying overseas in Europe, the global centre of the glass market.

Discussing a project that put his ability to protect the design to the test, Kooymans recalled the work he did on another high-profile Downtown project, [The HUB](#). “The biggest challenge that we had was that we wanted to tighten the specification on the flatness of the glass,” Kooymans said. Working with glass on a large scale, the practice of tempering has become an industry standard as a way of strengthening the inherently brittle material, but there’s a catch. Kooymans explained that, during the heating process, tempered glass becomes slightly disfigured, not to the extent that it is visible on the surface, however the effects are seen in the reflections.



View of the upper floors and crown of the HUB, image from submission to City of Toronto

When it came to the design of the HUB, architect [Rogers Stirk Harbour + Partners](#) wanted to do anything possible to minimize these imperfect reflections caused by tempered glass, and presented the task to RJC. To find a solution, Kooymans took the problem overseas, and proposed they monitor the heat treating process with UV light to reveal distortions immediately, thus allowing the manufacturer to adjust the process for the best possible results. “That quality control aspect is a big part of the design conversation and specifications,” he said.

Finally, Kooymans explained that the most important part of his job, arguably, is providing a level of assurance to the client that their design will not fail. “Having us involved in the early

stages allows the design team to explore a lot more options,” he said, “but more importantly, you’re bringing to the market a system that is engineered and works.”

Looking at an impressive project that was recently completed at the Square One Shopping Centre in Mississauga, a cylindrical glass entryway referred to as the Rotunda, Kooymans outlined the extra steps they went through to get that structure built. “Quite often what we do when we come up with something that’s very unique like this is we test it,” he said.



The Rotunda entrance at Square One Shopping Centre, image courtesy of RJC Engineers

The testing for the Rotunda began with the usual digital processes, running the design through different models to identify where the pressure points might be and how they might distribute the load. Digital modelling was only half the task though, “to satisfy ourselves and the authorities we actually do some physical testing to make sure that it behaves the way we’ve modelled it,” Kooymans said. For the Rotunda, this meant constructing a partial model at 1:1 scale. Considering that the project was completed in 2016 and remains the standout design feature of the shopping centre, the testing worked.

Looking forward, Kooymans expressed that he is excited to see the proliferation of glass as a viable construction material, and furthermore, to see designers continue to explore its possibilities. “The world is getting a lot smaller,” he said. “People are seeing what is being done all over the world, and when they start to see what’s possible, they want it for their project too.”